UNITED STATES DEPARTMENT OF AGRICULTURE — FOREST SERVICE — SBNF

Reply To:3400

Date: June 1, 1992

Subject: Bark beetle infested slash, Frog Timber Stand Improvement (Report S-92-02)

To: Dan Craig, District Ranger
San Gorgonio Ranger District

Dear Dan:

On May 19 and 21 I accompanied forester Ed Zeikus to examine some bark beetle infested slash on the Frog TSI. Ed had observed pest activity in the slash and called me to identify the problem.

Cutting occurred in summer and fall of 1991. The material was lopped and scattered for rapid drying in a manner consistent with accepted guidelines on the creation of slash. However, the material did not dry out, and much of the phloem is still in excellent condition, allowing for the buildup of bark beetles. Most of the activity we observed was that of Ips engraver beetles, particularly I. pini in the Jeffrey pine slash. It is likely that I. paraconfusus was present in ponderosa pine slash. In addition, we observed a few Dendroctonus beetles in the slash, including what was probably D. jeffreyi, the Jeffrey pine beetle, and D. brevicomis, the western pine beetle. White fir slash was present as a minor component, but no evidence of successful bark beetle attack was seen in that species.

Pine engraver beetles are by far the most serious problem on the site. The brood I examined was in the late larval and early pupal stages, suggesting that emergence could begin in about one to two weeks. However, time to complete development is dependent on ambient temperatures, and thus cannot be predicted accurately. Further, a very hot spell might heat the slash enough to dry the phloem to the point where it is unsuitable for infestation. Temperatures would have to reach ca. 120 degrees Fahrenheit to kill the brood, however.

Ed stated that the south ca. 50 acres was thinned before Oct. 1 and the north ca. 40 acres thinned subsequently. I estimate that over 90% of the pine material in the northern portion is either infested with bark beetles or suitable for infestation (phloem is in excellent condition). Suitable uninfested slash could be attacked at any time, as there is evidence that these engraver beetles fly whenever the weather is warm.

In contrast, in the south 50 acres, with the exception of one spot of more recently created slash, I estimate that less than 10% of the pine material is suitable for bark beetle attack.

Management options include no action (leaving the material on the site), removing the slash from the site, and treating the slash to kill the brood.

If the no action alternative is chosen, the emerging beetles may attack nearby trees.

Under the second alternative, infested and uninfested but green material could be removed from the site. Ideally the material should be moved to an area where pines do not occur, such as at lower elevations on the district or to the high desert. Once the beetles have emerged and the green material has dried, the material could safely be sold. However, if removal is accomplished by public firewood collection, the public may consider the Forest Service liable for mortality in landscape pines that may become infested. An appropriate educational effort may mitigate this hazard.

The infested slash can be treated by various means to kill the brood. These means include insecticide application, enclosing the slash in clear plastic in full sun to heat it, burning, submersion in water, chipping, and burying. It is possible that driving over the slash with a tractor would loosen the bark, allowing rapid drying, but this would have to be determined empirically. As noted above, slash must be heated to 120 degrees to kill the brood -- higher than what is often obtained under clear plastic.

It is possible that this slash did not dry out properly because even though it was lopped and scattered, insufficient sunlight reached it to heat it. Since this was a thinning, not a harvest, sizeable openings were not created, and much of the ground has remained shaded. In addition, some of the trees had not been cut all the way through the stumps, leaving a living connection with the roots. Because both those with and without such connections were infested with bark beetles, I do not believe that this error contributed significantly to the lack of drying. Avoiding similar situations in the future might require that cut material be moved to a location where it is fully exposed to the sun, or wrapping the material in clear plastic or using other techniques to make it unsuitable as bark beetle habitat.

Enclosed is some general information about pine engravers and guidelines for managing slash.

Laura D. Merrill

Laura D. Merrill, Entomologist
Forest Pest Management
San Bernardino National Forest

encl.

PINE ENGRAVER BEETLES

Pine engraver, Ips spp., attacks have been recorded on most species of pines in California. These beetles kill saplings, poles and sawtimber up to about 26 inches dbh and the tops of even larger trees. Attacks on live trees are usually limited to trees which are suppressed, or stressed by dwarf mistletoe, root disease, drought, fire or the attack of other insects. If fresh slash is available in the spring, pine engravers may build up in an area and cause localized mortality or top killing by mid-summer.

Attacks are made with the coming of warm weather in the spring. Attacking males bore nuptial chambers in the inner bark and release a pheromone which attracts other beetles to the attack site. If many beetles are attracted, they may attack nearby trees and cause a group kill. Within a day or two of the attack by the male, two to five females enter the nuptial chamber and after mating, each female bores an individual egg gallery which lightly scores the sapwood. The size and pattern of the combined gallery pattern is often diagnostic of the species of Ips involved. The galleries are kept open by beetles pushing boring dust out through the entrance hole. Red boring dust collecting in bark crevices or spider webs is diagnostic of a successful attack. Eggs are laid in niches along the sides of the galleries. Larvae hatch from the eggs and feed in the phloem. They eventually pupate in cells at the end of their larval mines and transform to adults.

A new generation is produced in as little as 6-8 weeks in the spring to 4-6 weeks in mid-summer (August). Thus, several overlapping generations per year may be produced. The winter may be passed in any of the life stages of larvae, pupae, or adults, depending upon which Ips species is involved.

Outbreaks in standing, healthy trees are sporadic and of short duration, and are often associated with some temporary stress or shock afflicting the host species, such as drought or logging disturbance. Tree killing frequently occurs where green pine slash, which serves as breeding habitat is left untreated during spring and summer. To be suitable as pine engraver breeding habitat, pine slash must have bark from 1/8 to 1 inch thick (usually 3 to 26 inches diameter), must have succulent cambium and must remain moderately cool during the development period.

Fresh pine slash caused by thinning, dwarf mistletoe control work, construction or winter storm breakage can be modified in a number of ways to make it unsuitable for pine engraver breeding. One approach to minimizing damage is to schedule slash-generating activities mostly between mid-July and late-December, when the slash has a high probability of drying out, heating up, or spoiling before the beetles can complete their development. Utilization of the cut material to the smallest possible diameter will minimize the amount of breeding material available to engraver beetles. If green pine slash must be created during the sring and early summer, slash treatments are available to prevent the buildup of pine engraver populations. Because pine engravers can complete their development in about a month under ideal conditions, treatment should be carried out soon after cutting to be effective.

Slash treatment methods which generally work well include chipping, lopping and scattering slash in sunny areas to heat it up, crushing or mashing slash with logging equipment to make it unsuitable for pine engraver breeding, or piling and burning the slash within a month of cutting. Broadcast burning the slash might work if it could be done without damaging the residual stand. A method which has worked during the summer in hot climates is to pile slash in a sunny area and tightly cover the pile with clear plastic. If the temperature under the bark of slash in all parts of the pile reaches 120°F, all brood currently in the pile will be killed. Lower temperatures will not be effective and, where successful, this method will not prevent reinfestation of slash piles. Because most pine engraver attacks occur within a quarter-mile from the location where the beetles emerged, high value pines can be given some protection by removing fresh pine slash to areas which do not have pines.

Two practices which should generally be avoided are piling fresh pine slash without further treatment, and allowing slash to touch or remain near valuable leave trees.